

Head for safety

Are you getting the maximum benefits out of your head protection?

An MSA White Paper



WE KNOW WHAT'S AT STAKE.

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*According to RIDDOR statistics, being struck on the head by moving, flying or falling objects accounted for **13% of worker deaths from 2014-19**, and **10% of non-fatal injuries in 2019**¹. Taking this into account, head protection is essential – but helping to keep workers safe is about more than just physical kit and meeting compliance.*

Based on an industry panel webinar attended by health and safety professionals across the UK, this whitepaper reviews the vital importance of head protection for workers, including design and selection considerations, responding to different environments and applicable standards, and ways to embed safety protection awareness across the workforce.

It's hard to think of construction workers without hard hats, but they haven't always been commonplace. The first hard hat, created in the US by E.W. Bullard in 1919, was manufactured out of steamed canvas, glue and black paint. It revolutionised construction and mine worker safety². In 1933, when construction of the Golden Gate Bridge began, engineer Joseph Strauss became one of the first to insist that workers on the four-year project wore head protection. Prior to this, wearing protective equipment was optional in the US, contributing to a worker death rate of one per every million dollars spent on construction³.

Today, thanks to greater awareness and legislation (more later), things have changed. The PPE Directive (89/686/EEC) was first adopted by the European Council in 1989 and was implemented into UK law in 1992 as the 'Personal Protective Equipment (EC Directive) Regulations 1992. The introduction of this along with EU Regulations in 2016, and industrial safety helmet standards like EN397, have all increased the use of protection equipment and driven major technological advances by equipment manufacturers. Just looking at the differences between a helmet from the 1930s to the just-released MSA V-Gard® H1 safety helmet shows how far head protection technology has come, in terms of weight, strength and protection offered. Today, hard hats are much more sophisticated, and the fact that they are largely mandatory across the UK means significant gains for workers' safety.



Head injury risks remain ever-present

Despite this, even on a well-run, modern-day construction site, head injuries can still happen. Falling objects or electrical shocks, for instance, can do significant damage if a worker fails to wear their hard hat, is wearing a hard hat not suited to the task or work environment, or experiences an ultrahazardous or abnormally dangerous impact.

In the UK, according to RIDDOR statistics (published on 30 October by the Health and Safety Executive), being struck on the head by moving, flying or falling objects accounted for 13 per cent of worker deaths from 2014-19, and 10 per cent of all non-fatal injuries in 2019.

In 2017 Eurostat (Directorate-General of the European Commission, providing statistical information to institutions of the European Union) reported that head injuries accounted for over 22% of all fatal accidents and 6.5% of non-fatal injuries at work across the EU's 28 member states – many of which may have been avoidable with appropriate headgear⁴. So, what key considerations should be front-of-mind when selecting head protection equipment?

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Clearly, our head and the brain inside are integral to everything we are and everything we do. With 100,000 miles of blood vessels and 100 billion neurons, our brains make 35,000 decisions every single day⁵. It allows us to move, eat, breathe, think, feel emotions, store and recall memories and dream. But the brain is also a fragile organ. In the event of an accident, it's vulnerable.

Protecting the brain from harm is vital - especially when workers are operating in potentially hazardous conditions. Mechanical risks include falling objects, shocks, projectiles, bumps, falls or crushing. Chemical risks can arise from splashing or contact with molten metals, for example. Thermal risks range from very high or very low temperatures, hot liquids and materials. And electrical risks arise through exposure to wires, risk of contact and the possibility of arc flash.

Getting head protection right means designing the most suitable product functionality and achieving the associated benefits.

Developing a superior hard hat

Hard hats can be the most neglected PPE. They are often mistreated on construction sites, thrown in the back of a vehicle, or left in direct sunlight on the windshield.

Worker comfort is an ongoing concern for safety managers whose workers are on the front line, dealing directly with situations where they could get hurt or even sustain a fatal injury. Since workers may be wearing a hard hat for eight hours every day, it's no surprise that comfort and weight are major priorities. Battling headaches and sweating is not conducive to safe working. Yet hat weight does not dictate comfort. Rather, it's the quality of the hard hat suspension and adjustment mechanisms that helps to balance the helmet on the head. This in turn helps to maintain stability while aiding airflow and making it easier to adjust while wearing gloves. Overhead fabric straps, for example, provide a better fitting product compared to a cheaper, lighter weight hat that relies on plastic strap fixings.

With a good balanced fit, easy adjustment and ventilation when relevant, workers can be at ease wearing head protection all day, leaving them free to concentrate on the job in hand.

Contemporary styling and customisation, different shell colours and/or applying retroreflective stickers to differentiate roles/identities can all, for example, also enhance worker visibility and safety. Branding hard hats boosts corporate awareness on major projects, clearly identifying flagship teams, especially when operating under the 'considerate contractor' scheme. 70% of MSA hard hats supplied in the UK are branded.

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It goes without saying that scrutinising quality should be top of the list when choosing products. Does your hard hat manufacturer use premium materials and manufacturing processes to provide high levels of resistance, durability and maximum comfort? MSA, for example, operates an internal accredited laboratory performing daily testing to ensure continuous quality.

Whilst industrial hard hats sold in the UK are EN 397 approved, the standard also offers additional optional performance tests, including molten metal, electrical insulation, very low temperature or lateral deformation. This means that just because a hard hat conforms to EN 397, it is not necessarily suitable for all environments and applications. It's essential to use a hard hat that is tested for the appropriate purpose.



Engineering commercial benefits

Choosing a well-designed, good-fitting, durable and stylish hard hat offers several benefits. When a worker is comfortable, they will likely be happier and more confident, thus helping them to better focus on the task at hand. This contributes to an efficient more results-focused workforce. Forbes suggests that a happier worker can be up to 20% more productive⁶.

Wellbeing at work is important, particularly in industries like construction. And of course, lots of things can contribute to a worker's wellbeing on site. But just like those shoes that don't quite fit, an uncomfortable hard hat can bring the mood of your workforce down. By demonstrating investment in the wellbeing of your workforce with quality, comfortable hard hats, efficiency will rise, which will positively contribute to delivering projects on time and in budget.

Head protection and different environments

Many different sectors require head protection. The most important prerequisite for selecting equipment is fitness for purpose in the working environment. This starts with examining a worker's role and assessing the environment's specific risks. Some common factors to consider include:

Workers permanently exposed to risks e.g. construction workers, machine operators, miners, warehouse clerks, etc. These employees will wear the appropriate protection permanently and will be in their hard hats for long periods (typically a full shift – 8 hours or more). Comfort is a key criterion of choice in this case, and each helmet is an individually assigned piece of equipment.

Personnel occasionally exposed to risks e.g. plant or department managers, architects, etc. These individuals need to wear a helmet when going on site but will usually have it on their head for shorter periods. They will not need to carry out the same type of tasks or operations as their workers but will be exposed to similar risks. Comfort is still important, but probably not as critical. Again, a helmet is normally assigned on an individual basis.

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The type of suspension system (and cost) may differ for these different scenarios. A ratchet system will be more relevant for those permanently exposed to risk, while a slide adjustment system will still offer the expected comfort and be more economic.

Environmental conditions for those working outside e.g. construction operators. Here, equipment will have a major bearing on wellbeing at work. The choice of vented or unvented helmet may depend on the weather conditions, or the season. Generally speaking, vented hats can be used outdoors with high temperatures or when a worker has to travel distances and is likely to perspire, whereas when the environment is cold, or if there is a risk of projections of chemicals, hot liquids or electrical hazards, a non-vented shell should be used.

A helmet with a rain gutter will increase comfort by helping to reduce water drips down the neck but may not be suited to certain environments inherent to the Oil, Gas and Petrochemical sectors. Manufacturers offer accessories to bring warmth to the head during winter and freshness during summer. Summer liners with neck shades, provided they have a UPF 50+ approval, will also help to protect workers against the dangers of sun exposure. Always make sure to use seasonal liners that have been tested and approved with the helmet.

Low light environments require maximum visibility. Using high-visibility shells and reflective stickers increases safety, and a hard hat with a lamp holder may also be useful.

Atmosphere Explosible (ATEX) environments. These require workers to be equipped with appropriate PPE e.g. dissipative shoes. The helmet and accessories should be Electrostatic-Ineris approved.

Selecting the right head protection for the right application

Both the working environment and the application dictate the choice of equipment to ensure suitable and appropriate head protection. For example:

- **Electrical works:** when undertaking maintenance or repair work near live parts of electrical equipment choose an unvented helmet with "440 V AC" optional requirement from the EN397 norm. This is intended to provide protection to the wearer against short-term, accidental contact with live electrical conductors. Alternatively, depending on the risk analysis, look at 1000 V AC from EN 50365 – "Electrically insulating PPE for use on low voltage installations". This optional test ensures reliable protection against electric shock up to AC 1000 V or DC 1500 V – electrical class 0. Helmets with this approval can be called "electrician helmets". A helmet with 440 V AC or 1000 V AC options then falls into category 3 PPE when approved with either standard. Based on your risk analysis, visors should carry EN166 "8" or GS-ET-29 markings.
- **Confined space works:** here, selection should be based on short peaks or peakless and low profile, unvented helmets. If accessories need to be attached, make sure the combined helmet and accessory assembly remains compact.

- **Working at height applications:** to maximise field of vision when looking upward, a short brim or brimless safety helmet is most suitable. It should remain low profile, even when a visor or spectacles are attached or integrated, for improved wind resistance. A chinstrap is mandatory for any application where the user may have the risk that his/her helmet falls without the possibility to recover it. Because chinstraps offer better helmet retention and improved fit, they are becoming more widely requested for other applications. The most comfortable chinstraps are made of soft fabric and are ideally OEKO-TEX approved. Again, only use chinstraps or accessories approved for the helmet.

Helmet materials

Head shell material is obviously critical to protection performance. Currently, MSA manufactures using two main materials, selected dependant on the application. High-density polyethylene (HDPE) is a thermoplastic polymer offering a high strength-to-density ratio. HDPE provides good impact resistance at low temperatures but has limited rigidity. In comparison, Acrylonitrile butadiene styrene (ABS) is a thermoplastic polymer with high impact resistance and rigidity providing lateral crushing protection. It is more scratch resistant than HDPE and has a slightly longer service life. Other materials, like Glass Reinforced Fibre (GRP), are used for very high temperature applications such as steel mills and provide higher thermal resistance and solid mechanical performance.

Many environments call for approved helmet accessories to protect an operative's face, eyes and ears. Integrating accessories like a visor or over-spectacles into the helmet offers benefits – there is no risk of 'forgetting' to wear them and you'll see savings on replacement costs due to loss of glasses in the field. The eyewear is also kept away from damage when not in use.





Understanding PPE legislation – and buying safely

The entire safety industry is based around EU standards covering for products and their use. In April 2018, the PPE Regulation (EU) 2016/425 came into force, repealing the former PPE Directive 89/686/EEC to replace it with EU-wide legislation. Currently, CE certification (type testing) is limited to only five years, and distributors and importers of PPE are under new obligations to ensure equipment performs as claimed. In the event of a ‘no-deal’ Brexit, CE conformity will be replaced by a UK CE scheme.

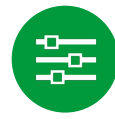
PPE is subject to around 200 different standards covering product performance requirements and testing methods used. In head protection the principal standards are:

- EN 397 (Industrial Helmets) – currently the European standard which specifies the requirements that need to be met for safety hats to be recognised as fit for purpose. It covers things like shock absorption, penetration resistance, flame resistance and chin strap anchorage
- EN 14052 (High Performance Industrial Helmets) – this exceeds the requirements of EN 397 to define a high-performance product with a higher impact rating
- EN 12492 (Helmets for Mountaineers) – a mountaineer standard that is often specified in industry for working at height
- EN 50365 (Insulating helmets for use on low voltage installations) – a standard which includes protection in electrical based work
- EN 812 (Industrial Bump Caps) – a standard for “bump caps” which are intended to provide protection against the wearer banging their head

In addition, where products are used in combination – for instance a helmet with a visor – all accessories must be tested and approved in combination.

To provide additional peace-of-mind when procuring PPE, the British Safety Industry Federation (BSIF) operates a Registered Safety Supplier Scheme. Member company products (such as those from MSA) are independently tested ensuring conformity and performance, and members are also audited annually to ensure they are maintaining their regulatory obligations. Scheme members also educate their customer-facing staff with an accredited qualification, ensuring accurate safety pre-sales advice. All BSIF Registered Safety Supplier members can be found at www.registeredsafetysupplierscheme.co.uk.

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Reducing injury risks: embedding a positive safety culture

In summary, great safety equipment serves no purpose unless employees embrace, welcome and use it. We have already discussed the importance of factors such as helmet comfort, ease-of-use and style in encouraging adoption and safe working practice. Happy employees help to increase wellbeing and productivity. Encouraging teams to look out for safety, contribute ideas and take responsibility means the wearing of PPE will be accepted and demanded. Each associate is effectively a safety leader. But how can we encourage crews to drive safer behaviours? Here are a few parting ideas to consider...

- **Be the example:** Always wear your hard hat and other PPE and check others do too. Encourage workers to look after their colleagues! Highlighting that someone can improve their safety should be seen as a positive.
- **Make operatives part of the selection process:** By allowing a small group of workers to test out a hard hat and give feedback on it, you can evaluate comfort, fit, and practicality issues upfront. Always ask for different samples from different manufacturers.
- **Continue to educate your workers on head protection safety awareness:** Work with hard hat manufacturers and local safety associations to support you.
- **Find the hidden risks:** Organise risk hunts with your crew to pinpoint new areas for attention.
- **Share real-world accident examples:** Demonstrate the consequences of failing to wear or choose appropriate hard hat protection. This isn't about frightening workers; it's about developing safety awareness.
- **Encourage incident transparency:** Unfortunately, mistakes will happen – a no blame culture encourages mistakes to be reported, investigated and lessons learnt to prevent re-occurrence.

1. RIDDOR
<https://www.hse.gov.uk/statistics/causinj/kinds-of-accident.pdf>

2. ISHN
<https://www.ishn.com/articles/110344-the-hard-hat-turns-100>

3. Smithsonian
<https://www.smithsonianmag.com/videos/category/history/30-workers-fell-while-building-the-golden-ga/>

4. Eurostat
https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Accidents_at_work_-_statistics_by_economic_activity#Analysis_by_injured_body_part

5. science.unctv.org
<http://science.unctv.org/content/weird-brain-facts>

6. Forbes, 2017
<https://www.forbes.com/sites/forbescoachescouncil/2017/12/13/promoting-employee-happiness-benefits-everyone/>



MSA—The Safety Company

Our business is safety. We've been the world's leading manufacturer of high-quality safety products since 1914. MSA products may be simple to use and maintain, but they're also highly-sophisticated devices and protective gear—the result of countless R&D hours, relentless testing and an unwavering commitment to quality that saves lives and protects millions of hard working men and women each and every day. Many of our most popular products integrate multiple combinations of electronics, mechanical systems and advanced materials to help ensure that users around the world remain protected in even the most hazardous of situations.

Our Mission

MSA's mission is to see to it that men and women may work in safety and that they, their families and their communities may live in health throughout the world.

MSA: WE KNOW WHAT'S AT STAKE.

Note: This Bulletin contains only a general description of the products shown. While product uses and performance capabilities are generally described, the products shall not, under any circumstances, be used by untrained or unqualified individuals. The products shall not be used until the product instructions/user manual, which contains detailed information concerning the proper use and care of the products, including any warnings or cautions, have been thoroughly read and understood. Specifications are subject to change without prior notice.

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